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Additional Studies on Rate and Number of Triadimefon (Bayleton 25% WP) Applications Needed for Control of Cedar Leaf Blight on Western Red Cedar at Humboldt Nursery

Susan Frankel, Plant Pathologist and James Nelson, Seedling Culturist

ABSTRACT

Rate and number of triadimefon (Bayleton 25% WP) applications were varied to determine if frequency and amount of chemical could be reduced while still maintaining control of cedar leaf blight on western red cedar. Monthly application April though August was compared to treatment every other month (April, June, August). Two rates were compared: 2 lbs/acre and 1 lb/acre. Trials were done in plug-1 transplants and 2-0 western red cedar beds. In both stock types, the disease severity rating between treated plots was low with no significant differences. All triadimefon treatments provided protection from cedar leaf blight. There was no significant difference between means for height or caliper for all treatments tested. The treatment with the lowest amount of pesticide is recommended, 1 lb/acre of Bayleton 25% WP applied April, June and August.

INTRODUCTION

Cedar leaf blight, caused by the fungus Didymascella (Keithia) thujina (Durand) Marie is a perennial pest on bareroot western red cedar seedlings at the Humboldt Nursery in northern California. Cedar leaf blight is found along the Pacific Coast as far north as British Columbia where it is damaging to containerized seedlings. In 1991 in western British Columbia over one million seedlings were culled due to the disease (Dennis, pers. comm.). The fungus was introduced to Europe from North America and has caused serious losses in nurseries in southern Britian and France (Dennis and Sutherland 1989).

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State and Private Forestry, Forest Pest Management
630 Sansome Street, San Francisco, California 94111

In 1989 triadimefon (Bayleton 50% WP) was shown to be effective for the control of cedar leaf blight (Frankel 1990). In that trial, spray applications were made monthly from March through November at a rate of 1 lb/acre. A 1990 trial demonstrated that the number of sprays could be reduced from 5 applications applied monthly from April through August to three applications in either April, July, August or April, May, June. There was no significant difference in mean disease severity for seedlings from plots treated 3 times and those treated 5 times. Mean height and mean caliper were also not significantly different in any of the treatments (Frankel 1991).

This report presents methods, results and discussion for a trial done in 1991 which investigated whether a lower rate of triadimefon would be effective for protection against cedar leaf blight. Several application schedules of triadimefon (Bayleton) at 1/2 the amount of active ingredient used in previous trials were tested. Bayleton 25% WP was used rather than Bayleton 50% WP. The 25% WP formulation is the turf & ornamental label and is more likely to be registered for use in conifer nurseries.

Triadimefon (Bayleton) is a triazole fungicide, 1-(4-Chlorophenoxy)-3, 3-dimethyl-1-(H-1,2,4-triazol-1-yl)-2-butanone. The 25% WP formulation is considered a slight immediate health hazard with a "warning" signal word on the label. No specific systemic symptoms of overexposure are known to occur in humans, although slight eye irritation may occur from contact with the powder or spray mixture (Mobay 1989). The material is registered for control of many fungal diseases on flowers, foliage plants, shrubs, turf, and shade trees. In California, Bayleton 25% WP is registered for rust control on pine trees. It is not currently registered for cedar leaf blight on western red cedar.

METHODS

Plots were established in 2-0 and plug-1 western red cedar beds at the USDA Forest Service Humboldt Nursery in northern California. A randomized complete block design was used with the 5 treatments replicated 4 times. Each replicate included 20 feet of bed (4 X 5 foot plots). All treatments consisted of triadimefon (Bayleton 25% WP) applied using a backpack sprayer, with foliage sprayed to run-off. The following rates and schedules were compared:

A. Bayleton 25, 2 lbs/acre, applied monthly from April - August (A-M-J-J-A).
B. Bayleton 25, 1 lb/acre, applied monthly from April - August (A-M-J-J-A).
C. Bayleton 25, 2 lbs/acre, applied every other month, April - August (A-J-A).
D. Bayleton 25, 1 lb/acre, applied every other month, April - August (A-J-A).
E. Control, water only, applied monthly from April - August (A-M-J-J-A).

On November 26, 1991, near the end of the growing season, 20 randomly selected seedlings from each plot were harvested for disease evaluation and growth measurements. Seedlings were clipped at the ground line; height, and caliper at the base were measured; and disease incidence was rated. Disease severity was visually estimated and rated on a 5 point scale where 1 = less than 20% of foliage infected, 2 = 21-40% of foliage infected, 3 = 41-60% of foliage

infected, 4 = 61-80% of foliage infected, and 5 = 81-100% of foliage infected. Analysis of variance was used for comparison of means. An arcsine transformation was done on the disease rating variable to convert percentages, which have a binomial distribution, into a normal distribution.

RESULTS AND DISCUSSION

All triadimefon treatments provided adequate protection from cedar leaf blight. There was no significant differences (p=.05) in disease severity in either the 2-0 or p-1 trials between any of the non-control treatments. In the 2-0 trial, the control seedlings, treated with water only, were moderately to heavily infected with the disease (3.79, 41 - 60% of the foliage infected); mean disease severity was significantly different (p=.05) from all treated plots. In the p-1 trial, the mean disease severity for control plots was moderately low (1.6, 21 - 40% of the foliage infected) but significantly higher (p=.05) than all treated plots.

For each trial, there were no significant differences (p=0.05) among any of the treatments for height and caliper. For 2-0 stock, seedling height averaged 41.4 cm. and caliper measured 5.5 mm. For p-1 stock, height averaged 75.0 cm and caliper averaged 8.7 mm (see Tables 1 and 2).

Table 1. Disease severity, height and caliper of 2-0 western red cedar seedlings sprayed with triadimefon (Bayleton 25% WP) at various times and rates for protection against cedar leaf blight. Values are means of 80 randomly selected seedlings per treatment.

Treatment rate/timing	Disease rating[1]	Height (cm)	Caliper (mm)
2 lbs/acre, A-M-J-J-A	0.86a[2]	40.9a	5.2a
1 lb/acre, A-M-J-J-A	0.75a	40.1a	4.9a
2 lbs/acre, A-J-A	0.79a	46.3a	6.3a
1 lb/acre, A-J-A	0.85a	40.5a	5.6a
Control, A-M-J-J-A	3.79b	39.2a	5.3a

1 Disease rating is based on a 5 point scale, where 1 = less than 20% of foliage infected, 2 = 21-40% of foliage infected, 3 = 41-60% of foliage infected, 4 = 61-80% of foliage infected, 5 = 81-100% of foliage infected.

2 Values followed by the same letter are not significantly different (p=0.05)

Table 2. Disease severity, height and caliper of p-1 western red cedar seedlings sprayed with triadimefon (Bayleton 25% WP) at various times and rates for protection against cedar leaf blight. Values are means of 80 randomly selected seedlings per treatment.

Treatment rate/timing	Disease rating[1]	Height (cm)	Caliper (mm)
2 lbs/acre, A-M-J-J-A	1.0a[2]	77.4a	8.7a
1 lb/acre, A-M-J-J-A	1.3a	76.1a	8.9a
2 lbs/acre, A-J-A	1.0a	72.4a	8.7a
1 lb/acre, A-J-A	1.0a	76.6a	8.9a
Control, A-M-J-J-A	1.6b	72.4a	8.4a

1 Disease rating is based on a 5 point scale, where 1 = less than 20% of foliage infected, 2 = 21-40% of foliage infected, 3 = 41-60% of foliage infected, 4 = 61-80% of foliage infected, 5 = 81-100% of foliage infected.

2 Values followed by the same letter are not significantly different (p=0.05)

Didymascella fruiting bodies were found on some seedlings in all treatments. Eight percent (8%) of the 800 seedlings examined appeared to be sign and symptom free.

Disease severity was lower in the p-1 control plots than in the 2-0 controls. This may be because the disease does not have as much time to develop when grown in a disease-free greenhouse for the first year and then transplanted into the nursery. Also contributing to this difference may be differences in resistance to cedar leaf blight for the seedlots sown for 2-0's and that used for the p-1's. In British Columbia, losses due to cedar leaf blight in plug-1 stock are heavy this year (Cope and Dennis, personal communication) indicating that changing to a p-1 growing regime will not necessarily eliminate the disease problem. If the plugs originate from a greenhouse with no Didymascella, infection levels may not build to moderate or severe levels in the subsequent year they are grown in the nursery. Climate conditions may impact disease development, and further testing is needed before this can be relied upon for disease control.

Based on a comparison of disease rating of untreated plots, disease severity was lower in 1991 than in 1990 or 1989. In 1991, the untreated control 2-0 seedlings had an average disease rating of 3.8 with approximately 41-60% of foliage infected. For p-1 control plots, disease severity averaged 1.6 with roughly 21-40% of foliage showing external symptoms of cedar leaf blight. In 1990 and 1989 the disease was more severe with untreated 2-0 seedlings averaging 61-80% infection.

Cedar leaf blight's impact on outplanting performance is unclear. An outplanting study of moderately infected western red cedar at Happy Camp, California indicates that some infection (less than 41% of the foliage infected) does not impede seedling growth and development to unacceptable levels. However outplanting trials in British Columbia, where seedlings were planted in wetter areas were showing unacceptable damage to seedlings. Further investigation is necessary to predict cedar leaf blight's behavior in plantations.

Testing is also needed to determine if the rates and frequency of triadimefon application could be reduced further.

CONCLUSIONS

Sprays of triadimefon (Bayleton 25% WP at 1 lb/acre) in April, June, and August, provided adequate protection against cedar leaf blight on 2-0 and p-1 western red cedar. Applications of triadimefon may be reduced to this treatment from the formerly recommended schedule of Bayleton 50% WP at 1 lb/acre applied every other month from April through August or monthly in April, May and June.

LITERATURE CITED

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